Serbia PRTR Implementation Overview – Guidelines for Emission Calculation

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Different kind of Guidelines in SEPA

- Guidelines for using SEPA IT system
- Guidelines for form filling
- Guidelines for emission calculation

These Guidelines have the purpose of reducing the possibility of errors in the calculation of emissions of pollutants into the air

Guidelines for using SEPA IT system

- 19 pages guidelines with all necessary informations for operators.

- With many pictures directly from software

Problem

- It is easier to call on phone and ask than to read simple guideline.

Guidelines for form filling

- All Serbian legislation which have a reporting obligation includes instructions for filling out forms for each field separately.

Problem

- It is easier to call on phone and ask than to read simple guideline.

Guidelines for emission determination

The release and transfer data on pollutants reported per facility can be based on three different principal determination methods:

a) Measurements using standardized or accepted methods; often, additional calculations are needed to convert the results of measurements into annual emission data;

b) Calculations using nationally or internationally agreed estimation methods and emission factors, which are representative for the industrial sectors;

c) Estimations (non-standardized) derived from best assumptions or expert guesses. Estimation is particularly relevant when reporting on accidental releases, as data on such releases are not necessarily immediately avalirale to the operator.

Guidelines for emission determination

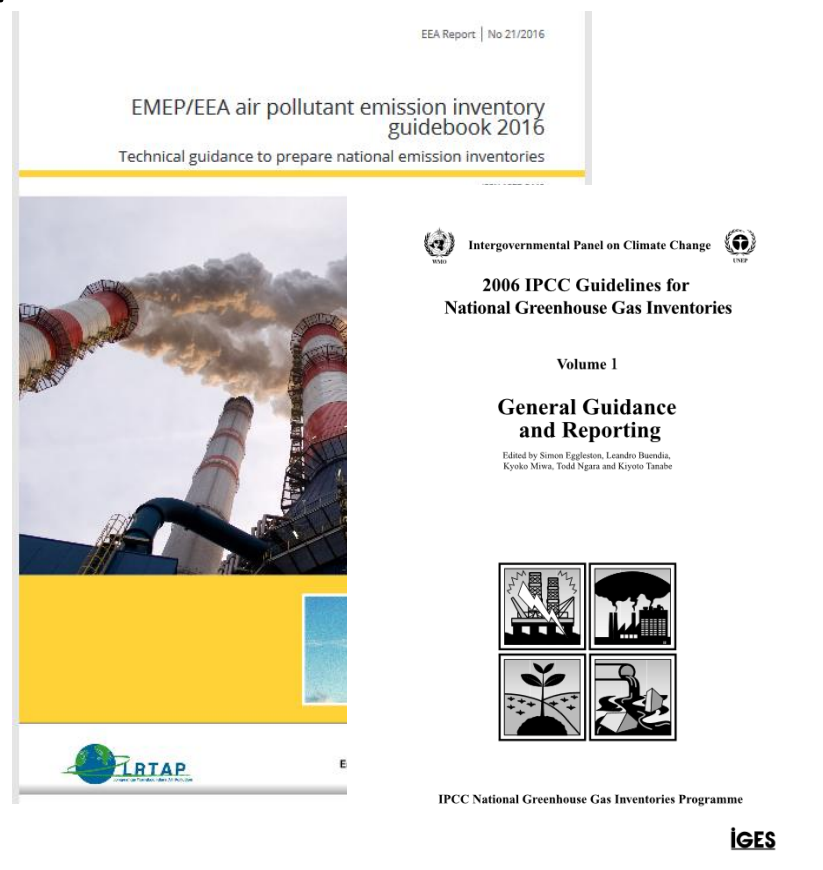| Table 13: Different types of determination methods for estimating releases and transfers of pollutants from facilities and classification as measurement (M), calculation (C) or estimation (E) (UNITAR, 1997)	
Type of measurement	**Classification for PRTR**
I. Direct Measurement	M
- Fugitive Air Emissions	M
- Measuring Point Source Air Emissions	M
- Measuring Surface Water Discharges	M
- Measuring Releases to Land	M
II. Materials Accounting and Mass Balance	C
- Estimating Fugitive Air Emissions by Materials Accounting	C
- Estimating Point Source Air Emissions by Materials Accounting	C
- Estimating Surface Water Discharges by Materials Accounting	C
- Estimating Releases to Land by Materials Accounting	C
III - Emission Factors	C
- Estimating Fugitive Air Emissions with Emission Factors	C
- Estimating Point Source Air Emissions with Emission Factors	C
- Estimating Surface Water Discharges and Releases to Land with Emission Factors	C
IV. Engineering Calculation	C / E
- Estimating Fugitive Air Emissions by Engineering Calculation	C / E
- Estimating Point Source Air Emissions by Engineering Calculation	C / E
- Estimating Surface Water Discharges by Engineering Calculation	C / E
- Estimating Releases to Land by Engineering Calculation	C / E

Guidance on Implementation of the Protocol on PRTR

Guidelines for emission calculation

The basis for guidelines developing are:

✓ 2016 EMEP/EEA air pollutant emission inventory guidebook

✓ 2006 IPCC Guidelines for National Inventories version 2015

EEA Report | No 21/2016

EMEP/EEA air pollutant emission inventory guidebook 2016

Technical guidance to prepare national emission inventories

Intergovernmental Panel on Climate Change

2006 IPCC Guidelines for National Greenhouse Gas Inventories

Volume 1

General Guidance and Reporting

Edited by Simon Eggleston, Leandro Buendia,
Kyoko Miwa, Todd Ngara and Kiyoto Tanabe

IPCC National Greenhouse Gas Inventories Programme

iGES

LRTAP

Guidelines for emission calculation

Algorithm

The Tier 1 approach equation for emissions calculation is

$$E_{\text{pollutant}} = AC \times EF_{\text{pollutant}}$$

$E_{pollutant}$ - annual emission of pollutant

$EF_{\text{pollutant}}$ - emission factor of pollutant

AC - activity data

Guidelines for emission calculation

Activity data

Activity data, according to the IPCC Guidelines for National Greenhouse Gas Inventories, are defined as data on the magnitude of human activity resulting in emissions or removals taking place during a given period of time.

Emission factors

An emission factor is defined as the average emission rate of a given GHG for a given source, relative to units of activity.

Guidelines for emission calculation

Table 3-2   Tier 1 emission factors for source category 1.A.1.a using hard coal

Tier 1 default emission factors					
	Code	Name			
NFR Source Category	1.A.1.a	Public electricity and heat production			
Fuel	Hard Coal				
Not applicable					
Not estimated	NH3				
Pollutant	**Value**	**Unit**	**95% confidence interval**		**Reference**
			Lower	**Upper**	
NOx	209	g/GJ	200	350	US EPA (1998), chapter 1.1
CO	8.7	g/GJ	6.15	15	US EPA (1998), chapter 1.1
NMVOC	1.0	g/GJ	0.6	2.4	US EPA (1998), chapter 1.1
SOx	820	g/GJ	330	5000	See Note
TSP	11.4	g/GJ	3	300	US EPA (1998), chapter 1.1
PM_{10}	7.7	g/GJ	2	200	US EPA (1998), chapter 1.1
$PM_{2.5}$	3.4	g/GJ	0.9	90	US EPA (1998), chapter 1.1

Guidelines for emission calculation

Category	1 A 1 a	
Name	Public electricity and heat production	

		Main Pollutants (from 1980)				Particulate Matter (from 2000)				Other (from 1980)
		NOx (as NO_2)	NMVOC	SOx (as SO_2)	NH_3	$PM_{2.5}$	PM_{10}	TSP	BC	CO
		kt	kt	kt	kt	kt	kt	kt	kt	kt

NRIZ: Nacionalni emisioni faktor

Name of fuel	Brown coal									
Emission factors table	3-3									
Emission factor		247	1,4	1350			7,9	11,7	1	8,7
Unit of measure		g/GJ	g/GJ	g/GJ		g/GJ	g/GJ	g/GJ	% of $PM_{2.5}$	g/GJ
Correction factor		1000000000	1000000000	1000000000	1	1000000000	1000000000	1000000000	1	1000000000
1990	290078277	71,6493	0,4061	391,6057	NA	0,9283	2,2916	3,3939	0,0093	2,5237
1991	247198934	61,0581	0,3461	333,7186	NA	0,7910	1,9529	2,8922	0,0079	2,1506
1992	243523672	60,1503	0,3409	328,7570	NA	0,7793	1,9238	2,8492	0,0078	2,1187
1993	255589497	63,1306	0,3578	345,0458	NA	0,8179	2,0192	2,9904	0,0082	2,2236
1994	259162071	64,0130	0,3628	349,8688	NA	0,8293	2,0474	3,0322	0,0083	2,2547
1995	264365329	65,2982	0,3701	356,8932	NA	0,8460	2,0885	3,0931	0,0085	2,3000
1996	242171701	59,8164	0,3390	326,9318	NA	0,7749	1,9132	2,8334	0,0077	2,1069

Guidelines for emission calculation

These guidelines are part of Serbian bylaws.

Their use is obligatory.

- Rules on the methodology for the development of national and local register of pollution sources and methodology for the type, method and time of data collection ("RS Official Gazette", Nos. 91/2010, 10/2013 and 98/2016)

document	Download	Directions and emission calculators
The text of the Ordinance amending the Ordinance 98/2016	📄	
The text of the Ordinance Amending Ordinance 10/2013	📄	
text Rules	📄	📄
Attachment 1.	📄	
Appendix 2.	📄	
Appendix 3.	📄	
Appendix 4.	📄	
Appendix 5.		
5.1 Broilers	📄	📊
5.2 Laying hens	📄	📊
5.3 pigs and sows	📄	📊
Form 1.	📄	
Form 2.	📄	

Guidelines for emission calculation

Guidelines for PRTR facilities which are diffuse sources such as :
- ✓ Livestock
    - Broilers
    - Laying hens
    - Pigs and sows
- ✓ Mining
- ✓ Landfills

Guidelines for emission calculation

Pollutants

For the purposes of reporting according to the National Register of Pollution Sources from broilers and other livestock farms, the quantities of the following pollutants emitted into the air are determined:

1. methane (CH_4);

2. nitrogen monoxide (NO);

3. ammonia (NH_3), and

4. suspended solid particles (PM_{10}).

Guidelines for emission calculation

Sources

There are five main sources of emission from broilers farms and other live poultry:

1. animal nutrition (PM, CH_4);

2. way of livestock production and environmental maintenance (NH_3, PM, NMVOC);

3. storage of manure (NH_3, NO, NMVOC, CH_4);

4. application of manure in the fields (NH_3, NO, NMVOC);

5. generated manure during outdoor living (CH_4, NH_3, NO, NMVOC).

Guidelines for emission calculation

Methodology

Calculation of the amount of air pollutants emitted from the farms of the cattle and other livestock is based on the equation:

$$E_{з.м.} = ПГБ_{жив.} \times ЕФ_{з.м./жив./год}$$

wherein:

$E_{з.м.}$ Quantity of emitted pollutants

$ПГБ_{жив.}$ Average annual number of animals

$ЕФ_{з.м./жив./год.}$ Emission factor of polluting substance per animal / year

Guidelines for emission calculation

Steps

The calculation of the amount of air pollutants emitted to farms for laying hense consists of three steps.

Step 1. Define the appropriate livestock categories that are farmed and calculate the average annual number of animals in each category.

Step 2. Find the appropriate emission factor for each category of animals in the emission factor tables.

Step 3. Calculate the quantities of certain emitted pollutants.

Every step has been explained in details.

Guidelines for emission calculation

Tables for activity data

Табела 2 Прорачун броја хранидбених дана у току године

Редни број турнуса у току године	Број узгојених животиња у току турнуса	Број дана трајања турнуса	Број хранидбених дана у турнусу Г=Б x В
А	Б	В	Г
1.			
2.			
3.			
4.			
5.			
6.			
7.			
ЗБИР БРОЈА ХРАНИДБЕНИХ ДАНА У ТОКУ ГОДИНЕ			

Guidelines for emission calculation

Emission factors

Емисиони фактори за категорију: Гајење бројлера

Загађујућа материја	Емисиони фактор	Јединица
NMVOC	0.108	kg/по животињи/годишње
NH_3	0.22	kg/по животињи/годишње
PM_{10}	0.069	kg/по животињи/годишње
NO	0.001	kg/по животињи/годишње
CH_4	0.01	kg/по животињи/годишње

Емисиони фактори за категорију: Гајење патака

Загађујућа материја	Емисиони фактор	Јединица
NMVOC	0.489	kg/по животињи/годишње
NH_3	0.68	kg/по животињи/годишње
PM_{10}	0.14	kg/по животињи/годишње
NO	0.004	kg/по животињи/годишње
CH_4	0.01	kg/по животињи/годишње

Guidelines for emission calculation

Emission calculation

Табела 3. Прорачун емисија у ваздух са фарми

Врста животиња	Просечни годишњи број животиња на фарми	Загађују ћа материја	Емисиони фактор kg/жив/год.	Количина емитоване загађујуће материје kg/год.
А	Б	В	Г	Д=Б × Г

Табела 4. Рекапитулација

Загађујућа материја из колоне В	Емитоване количине из колоне Д (kg/год)	Укупна емитована количина (kg/год)

Guidelines for emission calculation

Examples

Пример 2.

Фарма има капацитет 50.000 бројлера. У току године имала је четири турнуса са различитим искоришћењем и трајањем турнуса:

1. 50.000 бројлера/ 42 дана
2. 40.000 бројлера/ 45 дана
3. 20.000 бројлера/ 40 дана
4. 45.000 бројлера/ 40 дана

Број хранидбених дана

Редни број турнуса у току године A	Број узгојених животиња у току турнуса Б	Број дана трајања турнуса В	Број хранидбених дана у турнусу Г=Б х В Г
1	50000	42	2100000
2	40000	45	1800000
3	20000	40	800000
4	45000	40	1800000
5			
6			
7			
ЗБИР БРОЈА ХРАНИДБЕНИХ ДАНА У ТОКУ ГОДИНЕ			6500000

Просечни годишњи број животиња на фарми:

$$\text{ПГБ жив.} = \frac{\text{Број хранидбених дана}}{365}$$

$$\text{ПГБ жив.} = \frac{6.500.000}{365} = \textbf{17.808}$$

Guidelines for emission calculation

Emission calculator

✓ Easy to use tool

✓ Simple Excel file

✓ The values from

✓ yellow cells
   must be typed into
   air emission PRTR forms

Future activities

Development of Guidelines for emission calculation for energy, industry and other sectors.

This project is supported by UNECE PRTR protocol.

Guidelines on different languages:

- Serbian

- Russian

- Albanian

- All other WB countries.

THANK YOU FOR YOUR ATTENTION!